Intensive Agriculture

OCTOBER 1963

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Intensive Agriculture

VOLUME 1. No. 8 OCTOBER 1963

THE PICTURE ON THE COVER

Cotton, the white gold, has many enemies, as every cotton-grower knows. But a wise cotton-grower also knows how to tackle these enemies, so that he gets bumper crops every time. *For story on cotton enemies, turn to page 13.*

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Editor : Lal Karamchandani

Farm Information Unit
Directorate of Extension
Ministry of Food and Agriculture
Krishi Bhavan
New Delhi

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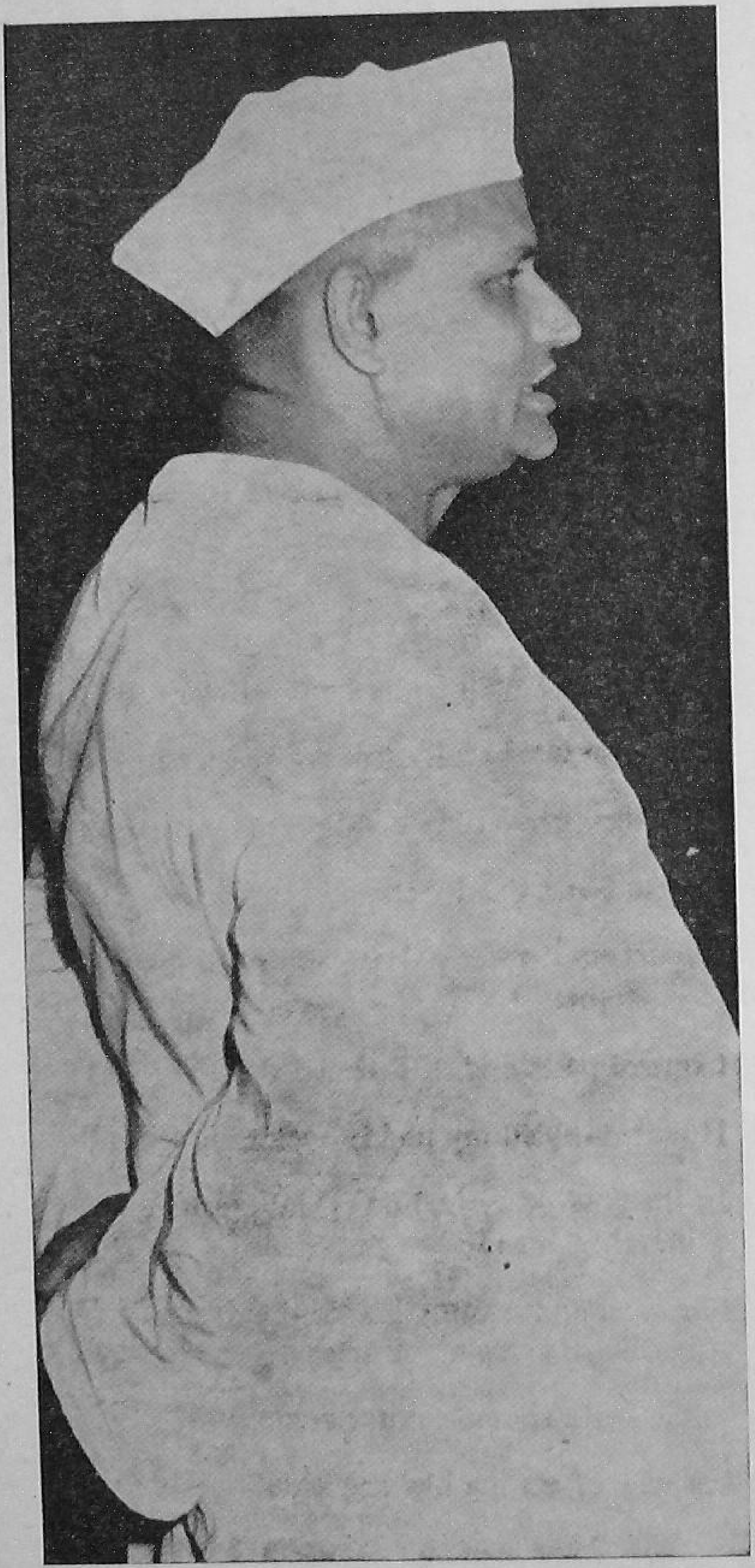


THE MINISTER HAS A WORD...

At a recent meeting of State Ministers of Agriculture, Dr. Ram Subhag Singh, Union Minister for Agriculture, placed his views on the current agricultural situation in the country.

WITH the object of attaining the 'take-off' stage in our economic development within the next few years, we have decided upon increasing agricultural production during the Third Plan to the extent of 30 per cent, as against the actual achievement of about 17 per cent and 19 per cent during the First and Second Five Year Plans, respectively.

Even ordinarily a 'step up' of this order would require a tremendous effort. Currently, however, we find that whereas under the First and Second Five Year Plans expansion in acreage could help in contributing a part of the increase in agricultural production, the scope of such contributions at present is very restricted.

Even though we have large tracts of lands lying waste due to ravines or saline or alkaline soils, the cost of their reclamation is so high that our limited resources would be better directed to comparatively early-maturing development programmes. As such, larger and larger reliance has to be placed on raising production from lands currently under cultivation.

This is possible by introducing double cropping through the extension of irrigation, more extensive use of improved seeds, fertilizers, manures and better implements and adoption of plant protection measures and other improved cultural practices. In fact, this is the only way of raising agricultural production in the country.

By virtue of her natural resources India is destined to be a prosperous nation. However, at present our resource utilization is poorly organized and productivity is low. While our best yields as reflected by

crop competitions in various parts of the country compare favourably with the best in the world, our average yields are much lower than those in other countries.

For example, Japan is getting 3 to 4 times the per-acre yield of rice as compared to us; a British farmer is raising about 4 to 5 times of wheat as compared to our Indian farmer; our yield of cotton is less than 1/5th of that of the Egypt, and our average yield per acre of sugarcane is less than half of that raised in Indonesia. These illustrations show as to what achievements should be within the range of possibility in the light of modern scientific and technological advances.

The factor which lends support to this argument is that the productivity in other countries has been rising over the last 60 or 70 years from the levels which were as low as ours 10 or 15 years back. In Japan, which is a country of small holdings, the index of agricultural production rose from 100 during the decade 1881-90 to 132 during the next decade, 165 in the second decade and to 215 during 1911-1920.

Thus Japan was able to more than double her agricultural production within four decades. I am confident that we can also bring about an agricultural revolution in the next ten to fifteen years by taking advantage of both simple improvements in prevailing techniques of production and also taking advantage of the modern scientific and technological improvements.

Fortunately by way of scientific knowledge we are fairly well equipped to work for an agricultural revolution. Over the past six decades our agricultural scientists and research workers have, through consistent work in laboratories and experimental farms, built up a valuable storehouse of knowledge and experience. In recent years, agricultural research has been given a great spurt. Under the Third Plan, we have provided an outlay of Rs. 26 crores as against the provision of Rs. 14 crores under the Second Plan.

Among the programmes for increasing agricultural production, irrigation, use of improved seeds, fertilizers and manures, plant protection, soil conservation and improved cultural practices occupy an important position.

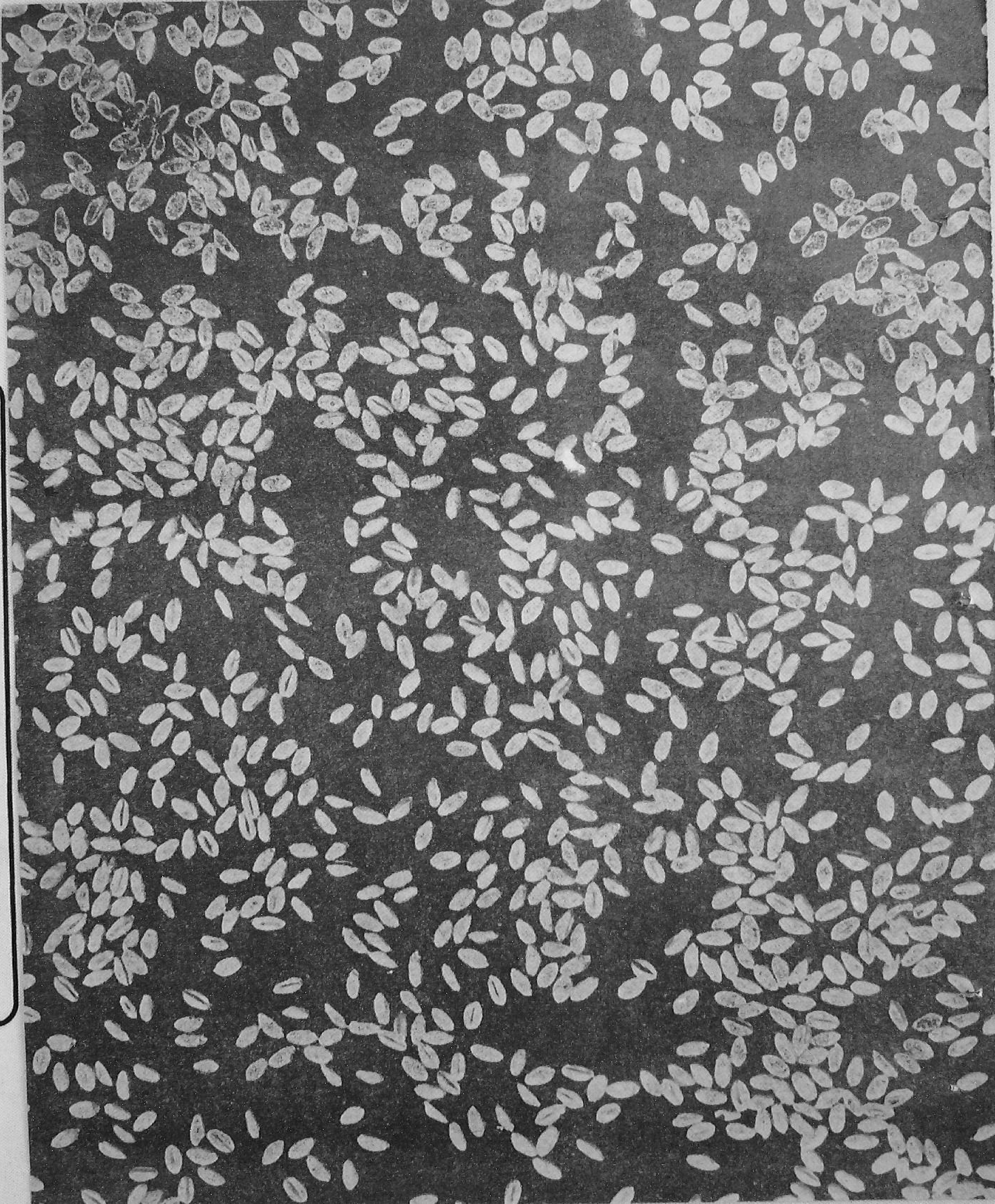
One of the most important programme on which a great deal of reliance has been placed under the Third Plan for achieving Plan targets of agricultural production will be achieved through the implementation of programmes envisaged for intensive use of manures and fertilizers. Since India has been put on the fertilizer map of the world only during the last one decade, there are a number of problems which should be tackled at every stage as we extend the use of fertilizers.

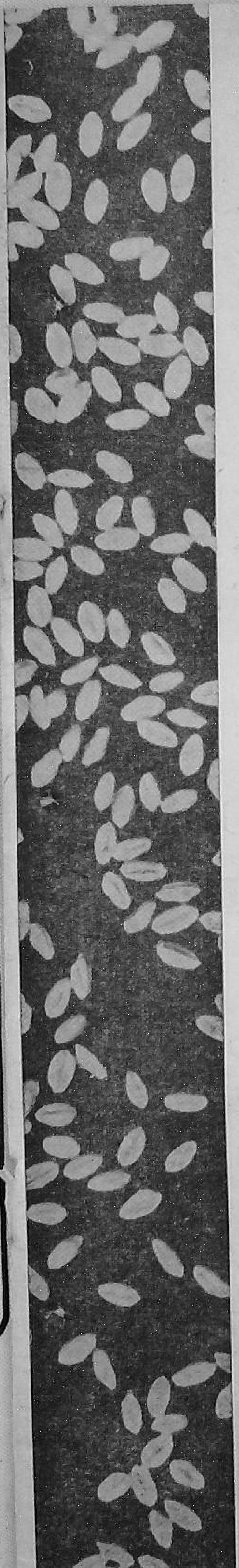
The Ministry of Agriculture has reduced the price of calcium ammonium nitrate—the new fertilizer whose production is showing good progress in the country—from Rs. 310 to Rs. 278 per metric ton. It has also been decided to give a rebate of Rs. 2.50 per metric ton per month for the stocking of fertilizers during the non-manuring season.

Recently, realizing the difficulties in the transport of fertilizers by rail, the Ministry of Agriculture has agreed to the transport of fertilizer, in some areas, by road up to a distance of 250 kilometres. The number of fertilizer demonstrations on the cultivators' fields has been increased from one lakh to three lakhs a year with effect from the current year.

We have also created a net work of country-wide Extension services. There is a need for strengthening this apparatus and improving its quality. However, the framework exists. Practically in each Development Block, we have Extension Officers for Agriculture, Animal Husbandry, Cooperation, Panchayats and other allied Departments. There are also Village Level Workers who have to spend all their time on agricultural development. Further, under the 'democratic decentralization', practically in all the States there are *panchayats,* Block *samities* and *zila parishads* as representative organizations of the people through which public participation can be achieved in carrying out programmes of development.

India leads the world in sesamum production. In 1962, *out of a world production of* 1.2 *million short tons (excluding mainland China), India produced* 4,41,000 *tons. The other principal sesamum-producing countries are Mexico and Sudan.*





It all started with just a handful of seed

By Manohar Prabhakar

In the Bundi District of Rajasthan, Ram Narain, a potter by birth but a farmer by profession, has performed a near miracle. Just from one handful of seed he has multiplied to a graneryful.

What has brought about this miracle is not just a few tricks. It is a story of patience and labour; it is a true story of how improved seed can work wonders.

It so happened that Ram Narain, about six years ago, came across an improved *Malvi* wheat variety displayed at an agricultural show put up by the State Department of Agriculture.

Ram Narain, always interested in trying out new things, asked for a few grains of that improved wheat, so that he could grow it on his own holding. But he was informed that the wheat grains displayed there were for demonstration, not for distribution.

Turned down this way, he was no doubt disappointed but not disheartened. After five days he came again to the fair and repeated his request. This time he was not disappointed. He was provided with one handful of grains the full *Malvi* wheat bag—just one grain !

He carried this seed to his farm and sowed it under the shade of a cane apple tree. He sowed it after digging and mixing fertilizers with the soil properly.

The seed sprouted, grew into a plant. He kept a close watch and watered every fortnight. The plant grew up and in due time brought forth 31 ears of wheat, to the great joy of Ram Narain. He reaped the plant, crushed the awns and got six chhatacks of wheat of very high quality.

The following year he sowed the previous year's entire grain. This time he used more fertilizers which helped the plants grow vigorously. Within four and a half months of sowing, they grew to a six feet height. Curious neighbours came to see his plants which were laden with well-developed ears. This time, the yield weighed a little over five seers.

These two experiences were enough to confirm his conviction that improved seed can work wonders.

In the third year, he sowed the entire yield, nourished it in a better way and got a little less than one and a half maunds.

By now, he had made it a mission of his life to supply his fellow farmers with improved wheat seed. But the land at his disposal was very small. In the fourth year he sowed 30 seers of his grain on his one *bigha* and reaped over nineteen maunds of seed. More farmers came with requests for improved wheat seed. He did not disappoint them. About 16 cultivators hailing from 12 different villages went back with his seed.

This in short is the story of a farmer and how he worked wonders with just a handful of seed. If he can do it, why not you !

BEET-ROOT CAN BE A FOOD AND A FODDER TOO

By L. VENKATARATNAM

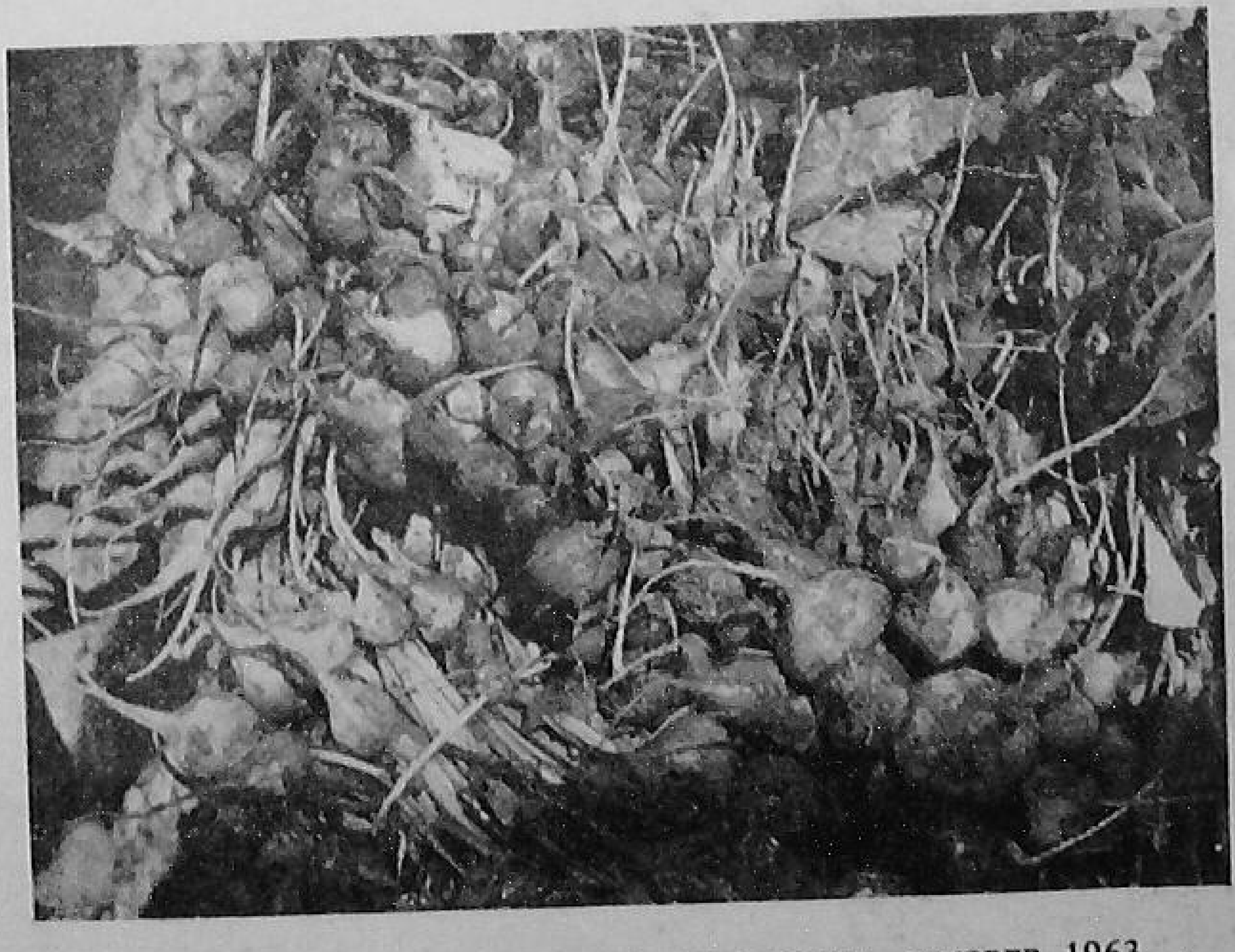
Dy. Director of Agriculture
Hyderabad

Here is a crop which farmers in north India can easily grow and make money with a very low investment. They can feed it to their cattle and thus reduce the expenses on cattle feed. They can sell it in the market as a vegetable and get good returns.

YOU can sow beet-root in lines with one foot spacing in November and December. Thin out the crop when it is about four weeks old. Very few farmers thin out the seedlings when they are five cm. high with the result that four to five beet-root seedlings grow in one clump resulting in deformed tubers of a small size.

From January, the beet-root grows fast and in eight

Beet-root is both palatable and nutritious



weeks occupies the whole field. The crop needs only four irrigations at intervals of three weeks.

Bright crimson coloured beet-roots of 3 to 4-inch diameter develop in about 100 days. You can harvest the crop from the first week of March. On an average, about 30 kilograms of beet-root can be harvested from each row of 30 feet.

The cost of cultivation of beet-root to an acre works out to about 500 rupees. And the returns from an acre will be about 800 rupees (400 maunds selling at Rs. 2 per maunds at fodder rates).

Thus it is seen that on an investment of about Rs. 500 one can expect a net income of over Rs. 300 on an acre.

Beet-root is nutritious also. That is why when fed to the milch cattle, at least a 10 per cent increased milk production can be obtained. The cattle also relish the beet-root.

Mysore has 70,000 acres of new area under cashewnut—40,000 acres were planted to cashew in the Second Five Year Plan period and 30,000 acres in the first two years of the Third Plan.

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Uttar Pradesh

Type-87

The seeds are bold and brown in colour; good for roasting and *dal*-making. It is a very high-yielding variety suited to a wide range of conditions.

N.P. 25

The seeds are reddish-brown in colour. It is a medium-duration variety.

Type 1

The seeds are brown in colour. It is an early

variety and a heavy-yielder.

Punjab

Pb-7

The seeds are brownish yellow in colour. It is a heavy yielder but susceptible to 'wilt' disease.

C-132

A high-yielding, wilt-resistant variety, but the grains are not so attractive as those of *PB*-7.

C-1234

A good variety, resistant to gram blight specially suited to areas where gram blight is a regular problem.

Kabuli-1

It is a high-yielding, bold seeded variety very much liked for culinary purposes.

N.P. 25 and *N.P.* 58.

These two are medium varieties, especially suited to dry farming areas. The seeds are light brown in colour.

Rajasthan

R.S. 10

This is drought-resistant, high-yielding variety of medium duration type. The seeds are medium sized and yellow in colour.

Delhi

N.P. 25 and *N.P.* 58.

These are two medium varieties, good for dry farming areas.

Madhya Pradesh

Adt-V and Dacca E.B. 28

These two are high-yielding varieties with medium sized brown seeds.

D.8

It is another high-yielding variety with small round, pink seeds, suitable for parching.

Gwalior-2

It is a heavy-yielding late-maturing variety suitable for light soils. The seeds are bold and reddish-brown in colour.

Gwalior-3

This variety is similar to *Gwalior* 2 but have small black seeds. It is suitable for Gwalior and adjoining districts.

Ujjain Pink-2

It is a late-maturing variety. The seeds are light pink in colour and are good for roasting.

Ujjain-21

It is an early-maturing variety—suitable for southern districts. The seeds are bold, yellow brown in colour and have rough coats.

Ujjain-24

It is a late maturing variety suitable for southern districts. Seeds are small, light brown and smooth.

Bihar

BR-17, *BR*-65 and *BR*-77

These are very good and high-yielding varieties.

Maharashtra

Chafa

It is a high-yielding variety, suitable for Kolaba, Thana, Nagar and Nasik areas. The seeds are large, golden yellow colour and are good for parching.

Bada chana

It is a good variety with bold seeds.

Gulab

This variety is suitable for Gujarat.

Hira chana

A variety good for culinary purposes. It has wrinkled green seeds of medium size.

Warangal

This variety is wilt-resistant and is suitable for Nagpur. The seeds are of medium size and brown in colour.

A-1-8

A high-yielding variety suitable for Basin tract. It has medium-sized brown seeds.

Andhra Pradesh

No. 63-8-12-41

This variety outyields local varieties by about 11 per cent, it is suitable for Rayalaseema District.

West Bengal

WB-75

It is a high-yielding variety.

S-4(*Sabour*)

It is a drought-resistant, medium-duration variety. The seeds are bold and reddish in colour.

Madras

CO-1

This variety is particularly suitable for Coimbatore.

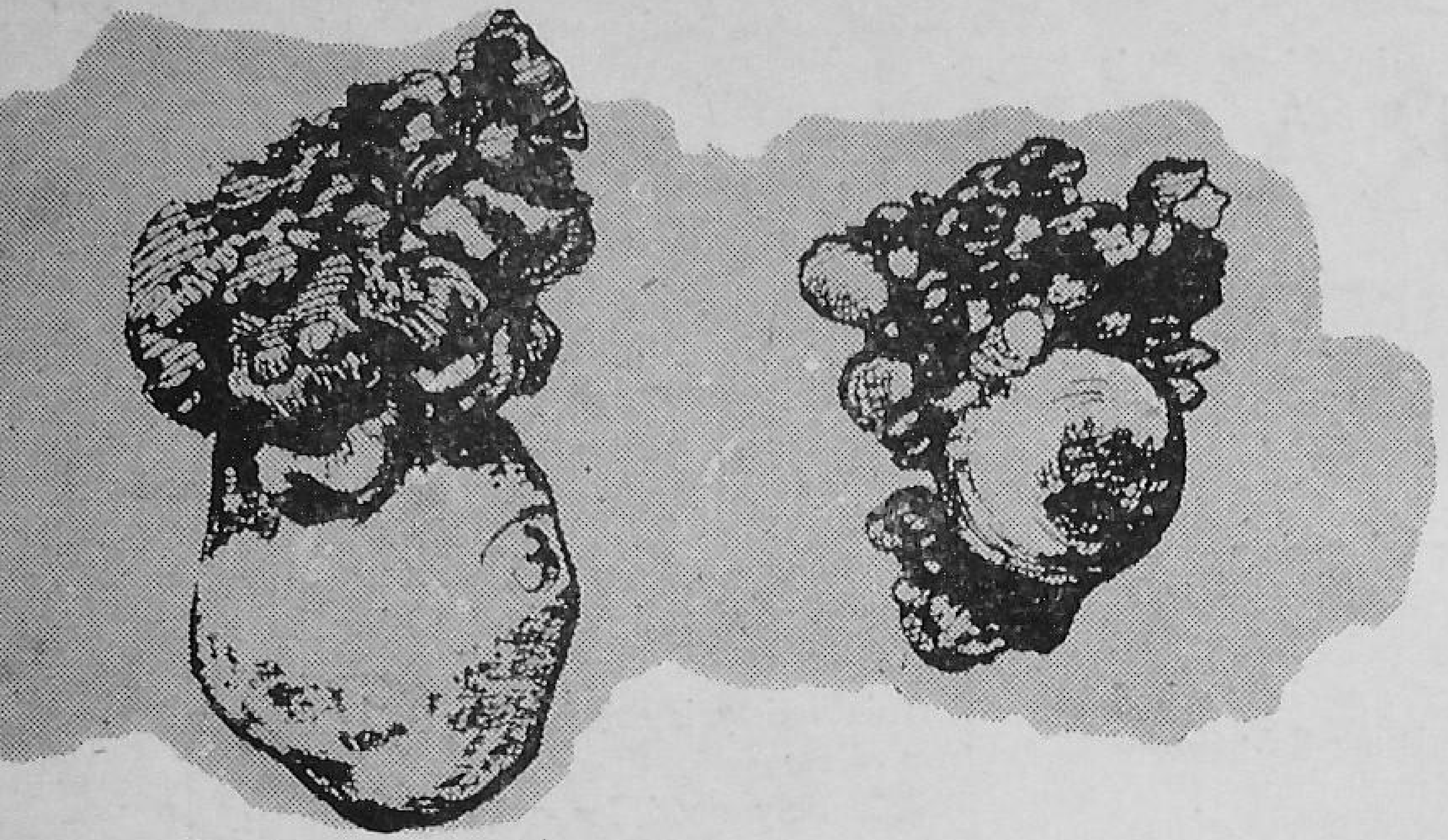
Mysore

Gram 18-12

It is a highly wilt-resistant variety suitable for Belgaum, Bijapur and Dharwar Districts. The seeds are brown in colour.

Contact your Gram Sevak or the local Agricultural Officer for any information you may need. This time make it a point to start with a good variety only.

POTATO has a deadly ENEMY



By
A. K. ROY,
Mycologist, Jorhat, Assam.

IN 1953 a new disease of potato was reported from Darjeeling. This was the wart disease.

The potato wart is fairly common in Europe, U.S.A., Canada, South Africa and Peru in South America. Caused by a fungus, the potato wart it seems was carried from Europe into this counrty somewhere in early fifties.

The disease can live in the soil up to 15 years even in the absence of a host.

As the very name implies, the typical symptom of the wart disease is wart-like growths on the tuber. The infection occurs through the eyes of the tubers resulting in the formation of malformed outgrowths like lumps of cauliflower or cock's comb or simply nodules. It is very seldom that any symptom is seen on the aerial parts but occasionally coral-like structures can be seen at the base of the affected plant.

The size and shape of the malformations vary according to the variety, intensity of infection and the amount of soil water. In case of a light infection, warts may be pinhead or pealike structures. In worse cases, the whole potato may be covered by coral or cauliflower-like warts and shows no resemblance to a potato.

Warts may also come up on stolons but never on roots. The colour of warts may vary from brown to almost black, and that is why the disease is also known as black wart of potato. The tubers ultimately turn into a blackish brown mass and decompose releasing thousands of spores in the soil.

A high moisture content in the soil helps the spread of this disease, and that is the reason why the potato wart is worst in the wet season. A neutral to a slight acidic soil is conducive to the development of the disease.

The disease is prevelant in the Darjeeling District of West Bengal and in Nepal and Sikkim. The infection is very high—as much as 80 per cent—in some localities at a height of 2,000 to 8,000 feet.

The varieties *Red Round, White Round* and *Kala Alu* are susceptible to the wart disease. The *Red Round* variety is more susceptible while *White Round* or *Kala Alu* are less susceptible.

Potato-growers are, therefore, warned not to use any of these varieties from Darjeeling for seed purposes.

There are as yet no control methods in India. However some of the control measures as practised in other countries are a good drainage; treating the soil with sulphur—a dose of 2,000 pounds of ammonium thiocyanate has given good results; selection of resistant varieties.

Potato growers, therefore, should be on the look out for symptoms of this disease. For, once the disease is in, there is no way out of it.

ASPARAGUS

a paying, palatable vegetable

By A. S. SANDHU

A VEGETABLE that needs to be more popular in this country is that palatable perennial asparagus.

Asparagus is a crop of temperate regions but can stand both heat and cold. However, it does well where either a low temperature or drought stops its growth and gives a rest period, for it is in this dormant period that important chemical changes take place for the development of the plant.

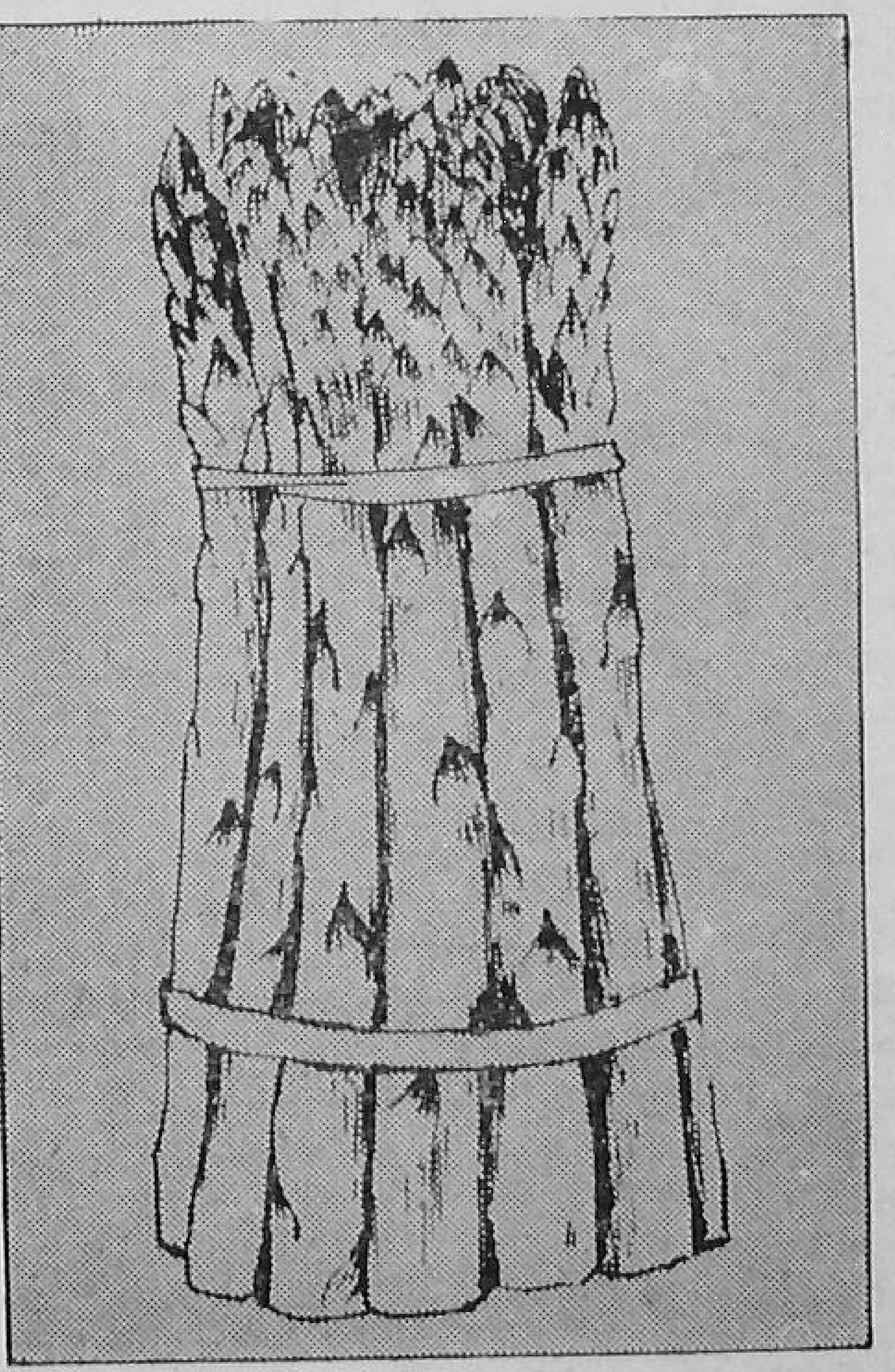
You can grow it in the plains, of course, with suitable care and under suitable conditions but it comes up best in the hilly areas.

Asparagus has an extensive root system. Therefore, select soil which is deep, loose and well-drained. Well-manured sandy loam soils are considered to be the best. This crop can grow well even on the soil which has a salt content too high for many other crops, but it prefers neutral soils. Plough up the land deeply and thoroughly. See that it is perfectly free from weeds.

Asparagus is a perennial crop which remains in the field for 12 to 15 years. Hence it is very necessary that the soil is made fertile and put in the best physical condition.

Asparagus requires a good amount of humus for its optimum growth. Apply about 30 to 40 cart-loads of well-prepared compost to an acre and mix it well in the soil.

Compost or farmyard manure improves the physical structure of the soil besides providing plant food nutrients. If you use chemical fertilizers in addition to manuring it will be all the more good. Plant the seeds of asparagus in a nursery. These will produce 'crowns'. These crowns are then planted in the field.



Sow the seed in the nursery from the end of January to the middle of March in plains and during April and May in the hills; where it is allowed to grow for full one season.

Sow the seed in rows two feet apart, giving a spacing of three to four inches between plants. The seed germinates slowly taking about a month. However, it

will germinate better and quicker if soaked for about three days before sowing. About three to four kilograms of seeds will suffice for an acre.

Transplant the crowns in rows when they are a year old and six to nine inches tall. You should do this in December-January when they are still dormant.

There are only a few varieties of asparagus and even among them the difference is not much. The two important varieties are : Mary Washington and Marth Washington.

If you have any difficulty in getting the seeds of these varieties, contact the Vegetable Botanist, Punjab Agricultural University, Ludhiana.

system extensively. From the third year onwards, you can cut the spears for consumption. After you have harvested, apply 10 to 15 cartloads of farm manure together with about 40 kilograms each of muriate of potash and superphosphate and mix them well with the soil.

You need not irrigate the crop from December to January but as soon as the weather warms up, you should irrigate the crop regularly. In hot months you should irrigate more frequently—even once a week.

Start harvesting from the third year onwards by cutting spears when they are six to nine inches long.

A year-old asparagus crowns are used for starting a new bed. The asparagus roots on the right will make weak plants

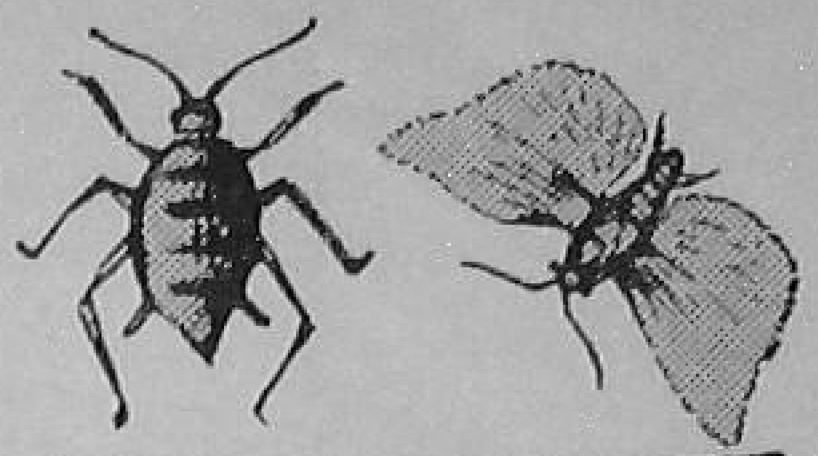
After about six months of planting new tender shoots will come out. These are known as 'spears' and are the edible portion of the plant. At this stage, apply about 75 kilograms of any nitrogenous fertilizer to supply about 30 to 40 pounds of nitrogen to an acre as a top-dressing and mix it well with the soil. Apply similar doses of fertilizer every year in the beginning of March.

Do not harvest the spears for the first two years. This will encourage the plants to develop their root

You can take cuttings for two to three months. Harvest the crop on every alternate day in the beginning but every day when the season has warmed up.

If you want to produce white asparagus shoots, heap the soil about a foot high around the rows. As soon as the spears come out of the soil, cut them before they turn green. This practice is called planching.

CONTROL PESTS AND DISEASES OF COTTON



By
D. B. Reddy
Plant Protection Specialist
Directorate of Extension
New Delhi

THERE are many insects pests and diseases which attack cotton and cause heavy losses. Here are some of the important ones and how these can be controlled.

Pink Bollworms

Pink caterpillars of a dark brown moth with numerous blackish spots damage the bolls. They bring down the quality and also affect the quantity of *kapas*. The ginning percentage of *kapas*, germinating capacity and the oil-content of the seed are reduced, as a result.

The moths emerge in the first week of April, but they are most active during July-August. The young caterpillars feed on flowers or leaves for a short while or bore into the bolls immediately. This results in the shedding of flower buds and flowers. The caterpillars in the bolls feed on the developing seeds with the result that the lint formation is arrested.

The pest is found throughout the country, but is most destructive in Gujarat, Andhra Pradesh, Madhya Pradesh and parts of Maharashtra. It is more serious on American cottons than on the indigenous varieties.

Spotted Bollworms

The caterpillars of these moths are a serious pest of cotton throughout the country. They also attack many other crops. The wings of one moth are pretty and grass green in colour, and of the other are yellow with a prominent greenish band in the middle of the forewings.

The caterpillars are dull greenish white in colour with spiny body and a number of black and orange spots. When the crop is young, caterpillars bore into the top tender shoots which, as a result, wither and droop. They also attack buds and bolls and feed on them.

The caterpillars prefer mature bolls to young bolls. The damaged bolls fall on the ground; those which do not shed, open prematurely and badly. The yield is reduced and the quality of the *kapas* is also poor.

Late-maturing varieties of American cotton suffer more than the early-maturing ones.

Jassids

Jassids are the small insects which turn greenish yellow in summer and reddish in winter. Their forewings have black spots; there are two black spots on the vertex also.

Both the adults and the young ones suck the sap from the underside of the leaves. The attacked leaves curl and roll up. The initial damage is the yellowing of margins of the leaves. When the attack is severe, the leaves turn dark brick-red and dry up; they may drop off.

Jassids attack many other important cultivated crops also and are found throughout the year. However, the damage is most severe during July-September and December-January. American cottons are most susceptible.

CON

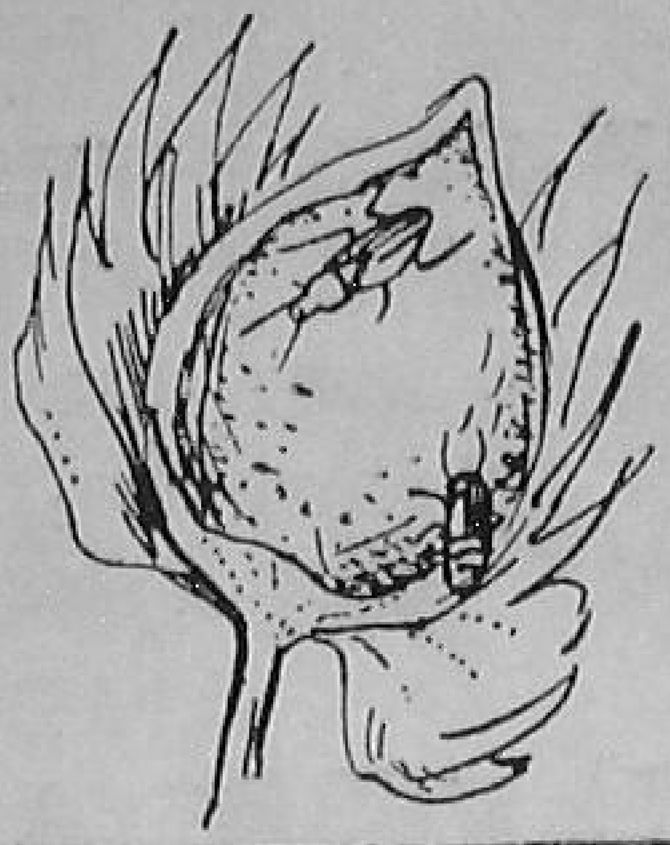
PESTS AND

O

COT

RED COTTON BUG

- Collect bugs in kerosenised water.
- Dust 5 per cent BHC or DDT or 10 per cent Carbaryl.



BACTERIAL BLIGHT

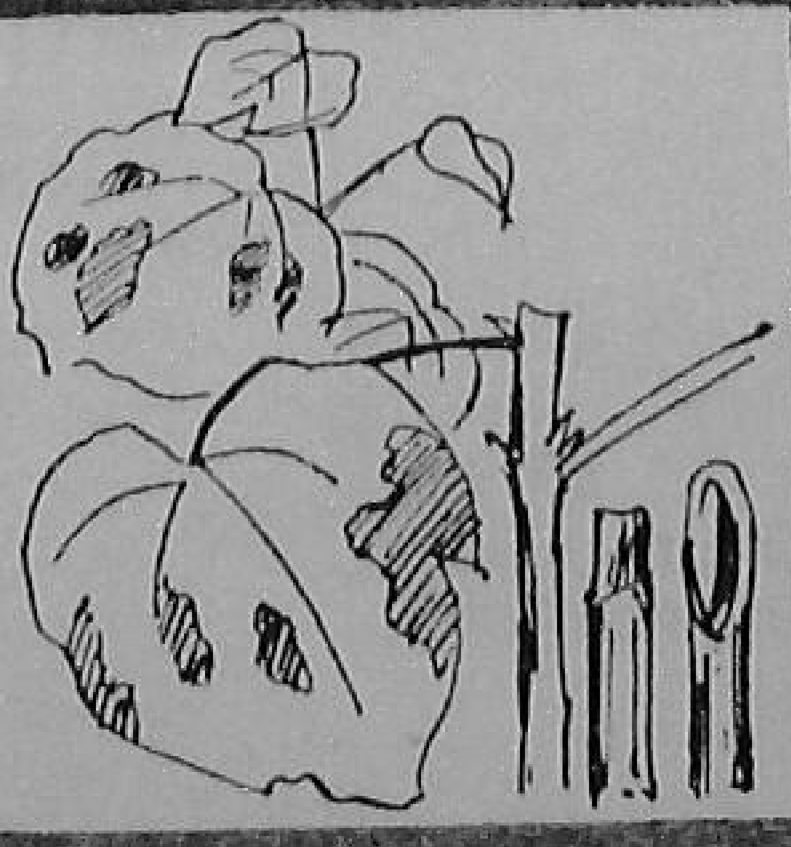
- Treat seed before sowing with an organo-mercurial compound.
- Destroy diseased plant residues.
- Use resistant varieties.

SPOTTED BOLL-WORM

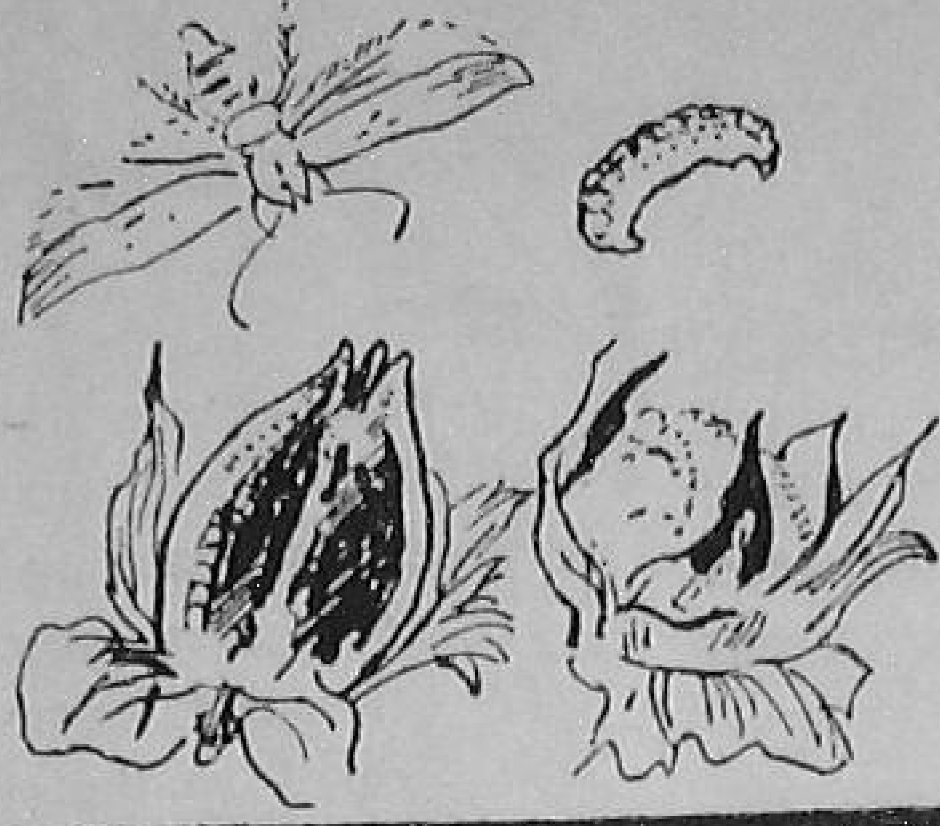
- Destroy stubbles and other host plants.
- Avoid ratoon cropping.
- Spray 0.03 per cent Endrin or 0.1 per cent Carbaryl or dust 10 per cent Carbaryl.

WILT

- Use resistant varieties
- Sow early
- Sow *desi* cotton mixed with American cotton.



TROL
DISEASES
F
TON



PINK BOLLWORM

- Collect and destroy debris.
- Spray 0.03 per cent Endrin or 0.1 per cent Carbaryl or dust 10 per cent Carbaryl at square formation and later, if necessary.
- Fumigate seed with methyl bromide before storing.

ANTHRACNOSE

- Treat seed before sowing with an organo-mercurial compound.
- Destroy diseased plant residues.
- Adopt a suitable crop rotation.

APHIDS

- Spray a mixture of 0.1 per cent BHC and 0.1 per cent DDT or 0.02 per cent Endrin or Parathion or 0.1 per cent Carbaryl or dust 10 per cent Carbaryl. Repeat two to three times.

JASSIDS

- Spray a mixture of 0.1 per cent BHC and 0.1 per cent DDT or 0.02 per cent Endrin or Parathion or dust 10 per cent Carbaryl. Repeat two to three times.

White Flies

These are very small insects. The attack is more severe on an early-sown crop. They are active from May-June to August.

These insects injure the cotton crop by sucking the sap and by secreting honey-dew on which the sooty mould grows. The attacked flowers and bolls do not develop well, and shed. The insects if they attack at a later stage affect the development of the seed and the lint resulting in the reduction of *kapas* yield.

These insects appear in a large number when the temperature is high and rainfall scanty.

Cotton Stem Weevil

The insect starts attacking when the plants are young. Larvae of the weevil enter the stem and cause swellings just above the ground level. The young plants are killed and the older plants which survive the attack become weak and during strong winds break at the place of attack. A humid climate with a fairly high temperature is favourable for the insect.

Leaf Roller

The caterpillars are greenish with dark brown head. They attack the underside of the leaves and later roll them into trumpet-shaped structures, and feed from inside.

The caterpillars are active from the middle of July to the end of November. A damp and cloudy weather is favourable for a rapid multiplication of this insect. The adult moth is yellowish white with greyish wings.

Aphids

Large numbers of aphids are usually found on the underside of leaves and on tender shoots. They suck the sap and affect the vigour of the plant. Young leaves become crumpled. The young plants suffer more than the older ones. The plants are stunted in growth and become deformed. High humidity and cloudy weather with a low rainfall help the pest.

Cotton Stainers

Two bugs, the red cotton bug and the dusky cotton bug, are familiar to cotton-growers. The red cotton bug has deep red legs with a black membranous portion in the forewings. There is also a black spot on each forewing.

The dusky cotton bug, as the name suggests, is dusky in colour. The adults may suck the sap from the plants and may also feed on the bolls.

The presence of these bugs results in the staining of the cotton fibre. The red cotton bug is active from September to October, and the dusky cotton bug from November to February.

Mites

These are not insects but belong to the family of spiders. They are very small creatures which attack the leaves, causing pale green to whitish yellow spots. The spots may later change from yellow to purple red. The attacked leaves fall prematurely. Webbing may be formed on the shoot tips, buds or on the leaves.

Mites are green to bright red. One species causes a dense growth of whitish hair on the surface of the leaf and the stem. The effected leaves remain stunted and become hard and crisp.

Blackarm

It is a bacterial disease and occurs on American cotton. Small, water-soaked, circular spots appear on seedlings and angular leaf spots on the leaves. Elongated, greyish to sooty black lesions appear on the stem and the petioles. The spots are also found on the bolls.

The affected flower buds and young bolls may shed prematurely. The diseased mature bolls open prematurely, affecting the lint. The disease may affect the seed in the bolls. In severe cases, cracks, and gummosis develop and oozing may take place.

Wilt

In early stages of the attack, the cotyledons turn yellow and brown and the base of the petiole shows a brown central ring resulting in the death and falling of the affected parts. Leaves lose turgidity, become discoloured, start wilting and finally drop off.

The most characteristic symptom of the disease is the browning and blackening of the vascular tissues, which can be seen as a discoloured ring in the woody tissues when the affected branch is cut transversely.

The maximum damage is done when plants complete the vegetative phase. The affected plants produce some bolls which are small and open prematurely.

Root Rot

The most characteristic symptom is a sudden and complete wilting of the plant. The disease appears in more or less circular areas. Except the top root and a few secondary roots, all other roots of the affected plants decay, get detached and shed.

Anthracnose

The disease affects the seedlings, bracts and bolls. Small reddish or light-coloured spots are found on cotyledons and primary roots. The affected seedlings show reddish brown spots below the ground. These cause the death of the seedlings. On the bolls, the disease is seen as small, slightly depressed water-soaked circular spots which enlarge, and become reddish brown. Diseased bolls are deformed, dry up prematurely, stop growing and ultimately crack.

Grey Mildew

The disease occurs mostly in low-lying, moist areas. It appears towards the end of the growing season.

The typical symptom is a whitish growth on the underside of leaves resulting in a frosty appearance.

The spots are angular and are bordered by the veinlets of the leaf. As the disease progresses, the leaves may become yellowish brown and finally fall off prematurely.

Small Leaf Disease or Stenosis

The disease starts when the plants are two to three months old. All the aerial parts of the affected plants are stunted. They put forth numerous, extremely small leaves in clusters. The dormant buds give a profuse vegetative growth.

The leaves are variously lobed, and the lobes are reduced in number. The flowers remain small and the flower buds and young buds fall off prematurely. Premature bolls are very small and do not contain any viable seed. The root system of the diseased plants is poorly developed.

CONTROL MEASURES

Many pests and diseases of cotton are of regular occurrence at one or the other stage of the crop growth. The frequency and the time of occurrence of pests and diseases and their intensity, however, depend, to a large extent, on the conditions under which cotton is grown.

To obtain a pest and disease-free cotton crop, take the following control measures.

Field Sanitation

Remove the entire cotton stalks immediately after the harvest of the crop. These materially reduce the damage by the spotted bollworms and the stem weevil during the following season.

Keep the fields clean by removing stalks, and plant refuge and debris. This will remove the hibernating pink bollworm larvae and the sources of some diseases.

Seed Treatment

(i) Fumigate the seed with methyl bromide at the rate of one pound for 1,000 cubic feet of space for 24 hours, or expose it at temperatures of 55° to 60°C or dry it in the sun in a thin layer for about 8 hours during April to June, to kill the pink bollworm larvae in the seed.

(ii) Treat the seed with an organo-mercurial compound (one per cent active material) at 1:500 ratio, by weight, against black arm and anthracnose diseases.

(iii) Protect the germinating crop against the attack of grasshoppers, caterpillars, etc., by dusting the crop with 10 per cent BHC or 10 per cent Carbaryl at 5 to 9 kilograms per acre.

(iv) Protect the crop against the attack of thrips or other sucking insects, before starting a schedule of treatment, with 10 per cent BHC or Carbaryl dust or Endrin (20 per cent E.C.) at the rate of 10 mililitres in 100 litres or Parathion (46 to 50 per cent E.C.) at the rate of 40 mililitres in 100 litres.

(v) Observe the following schedule of treatment. This schedule, however, is intended for guidance and is subject to adjustments in regard to frequency of application depending on the intensity and kinds of pests or diseases, their frequency and the anticipated time of appearance, as warranted by local conditions.

The first treatment after five to six weeks of sowing

Spray a copper oxychloride (containing 50 per cent metallic copper) at the rate of one kilogram in 200 litres of water.

The second treatment on about a 10-week old crop

Spray Endrin (20 per cent E.C.) at the rate of one mililitre in one litre of water or Carbaryl (50 per cent W. P.) at the rate of one kilogram in 500 litres of water at 450 litres of spray per acre or dust 10 per cent Carbaryl at 5 to 9 kilograms per acre.

The treatment with copper oxychloride can be combined with the insecticide sprays. If you are using Carbaryl dust, spray copper oxychloride separately.

The third treatment on about a 12-week old crop

Repeat the second treatment *without* copper oxychloride.

(*Turn to page 28*)

How I doubled my PADDY YIELDS

I TRIED early planting of *dalwa* paddy on a 0.25 cents area of my plot under the guidance and advice of the Package Programme officials and obtained double the yield. The variety was *MTU*. 15.

I treated the seed with Agrosan and sowed on the 18th December 1962. I sprayed the seed-bed twice with Endrin and transplanted the seedlings on 17th January' 63—fifteen to twenty days earlier than the normal planting time.

I followed the modified Japanese method of paddy cultivation, with a six-inch by four-inch spacing.

Here is the detail of the treatment I had given to my crop.

BASAL DRESSING		
Glyricidia leaf 400 lbs.	Rs.	4.00
25 lbs. ammonium sulphate		5.00
55 lbs. superphosphate		5.50
8 lbs. muriate of potash		2.00
Top-dressing		
25 lbs. ammonium sulphate		5.00
PLANT PROTECTION		
Sprayed Endrin on 7.2.63 and 10.3.63 (Stem borer was thoroughly prevented)		3.00
Intercultivation (push-hoeing)		2.00
Additional cost for 0.25 cents		26.50
Additional cost per acre		106.00

In 1959-60, this area had *dalwa* as the second crop. Then the yield was only 8 bags of paddy per acre. The Package Programme was not yet introduced in this District.

Value of 8 bags of paddy 8x25		Rs. 200.00
1963 dalwa paddy yield (25 cents)		924 lb.
1963 dalwa paddy yield per acre		3,808 lb.
In terms of bags of paddy		22 bags
Value of 22 bags of paddy	22x24=	528.00
		528.00
		200.00
Difference in income between 1959-60 and 1962-63 dalwa crops		328.00
Additional expenditure per acre in 1962-63		106.00
Additional income per acre in 1962-63		222.00

The result of early planting of *dalwa* has impressed me greatly. I have decided to adopt package of practices in full on whole of my six-acre plot and thereby expect to raise about 25 bags of paddy per acre.

—V. C. Subrahmanyam
Cherukugamma Village
Pentapadu Block
West Godavari District
Andhra Pradesh.

IN THE FIELD OF AGRICULTURE

MAHARASHTRA

MARCHES AHEAD

By
M. B. GHATGE
Director of Agriculture (Maharashtra), Poona

WITH the rest of the country, Maharashtra too is making a great headway in increasing her agricultural production.

The progress in Maharashtra's agricultural front is an all-round progress : soil conservation, irrigation, manures and fertilizers, improved cultural practices and plant protection measures.

Farmers everywhere in the State have taken up the challenge in right earnest and are fully mobilised to actively participate in the State-wide drive to maximise the agricultural production.

In the six-month emergency programme this year targets of 4.37 lakh acres for bunding and 5,140 acres for terracing were fixed.

More than four lakh acres were scheduled for contour-bunding during the six-month emergency programme

A place where two blades of grass grew before, now can boast of a bumper crop of jowar, *thanks to contour-bunding*

Under the land development programme, deep ploughing of land with tractors for the removal of weeds was undertaken. An area of 74,500 acres was deep ploughed during the six-month period.

Wells for irrigation play an important role in increasing the crop production. The target was 16,200 new wells and repair of 3,332 old wells.

In Deccan plateau, wells are often sunk through the hard rock. To expedite this work, the Agriculture Department kept apart 50 boring machines and 25 air compresser and blasting units. With the help of these machines, about 310 bores and 1,44,169 holes were made.

The Department of Agriculture also supplied 8,070 pumping sets to the farmers.

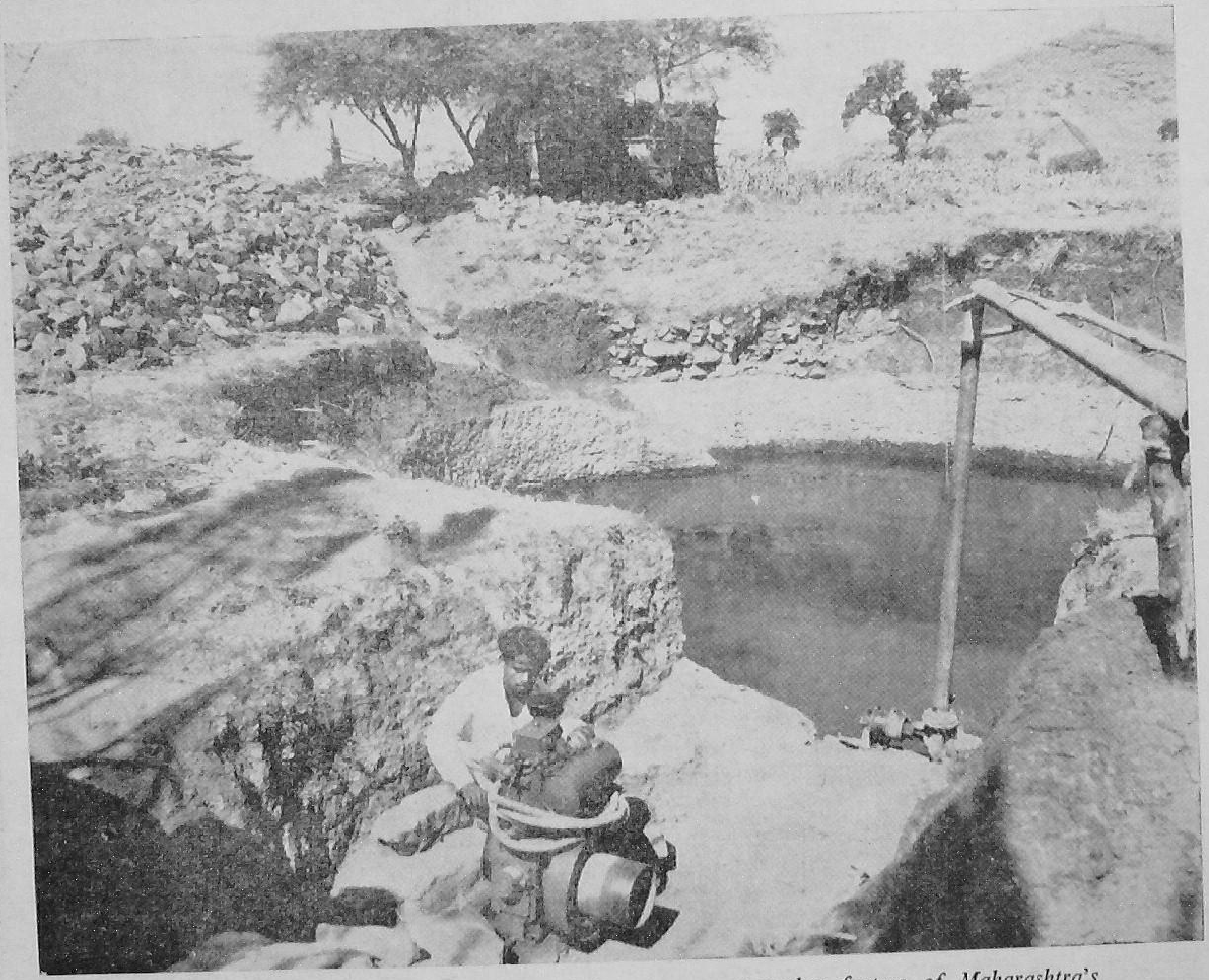
The targets for distribution of improved seeds were :

Crop	Area (acre)	Quantity (maunds)
Paddy	4,71,004	2,35,456
Jowar	22,48,000	2,36,700
Bajra	6,31,250	63,125
Wheat	2,33,000	1,16,900
Maize	27,000	13,600
Ragi	43,009	4,300
Gram	1,34,350	68,111

GET BIGGER YIELDS FROM EVERY FIELD

About 2.52 lakh tons of town compost, besides 3.89 lakh tons of rural compost were prepared. Also 57,444 maunds of green manure seed were distributed amongst the farmers.

occurs every year or where it breaks out in epidemic form covering large areas, aerial spraying on large scale becomes necessary. This year 2,35,000 acres will come under aerial spraying. Also about 3,88,000



More and more new wells fitted with pumping sets are yet another feature of Maharashtra's progress in agriculture

Among the chemical fertilizers, nearly 1.91 lakh tons of ammonium sulphate were distributed.

The State Agriculture Department has decided to undertake plant protection work more as a preventive measure than as a curative measure. Where a disease

acres will be covered against various pests and diseases.

Much has been done in this period, though much more remains to be done to further raise the agricultural production in Maharashtra.

Farmer Ponnuswamy is sold on clusterbeans for green manuring

Farmer Ponnuswamy on the advice of Extension afficials went in for clusterbeans for green manuring

By
D. GANAPATHY
Agriculture Extension Officer
Tiruvaiyaru, Madras

IN south India, all farmers know that clusterbean is a good vegetable. But only a few know that it is a good green manure crop too. One such farmer is Ponnuswamy Vaniar in Thiruvaiyaru Block of Thanjavur District of Madras State.

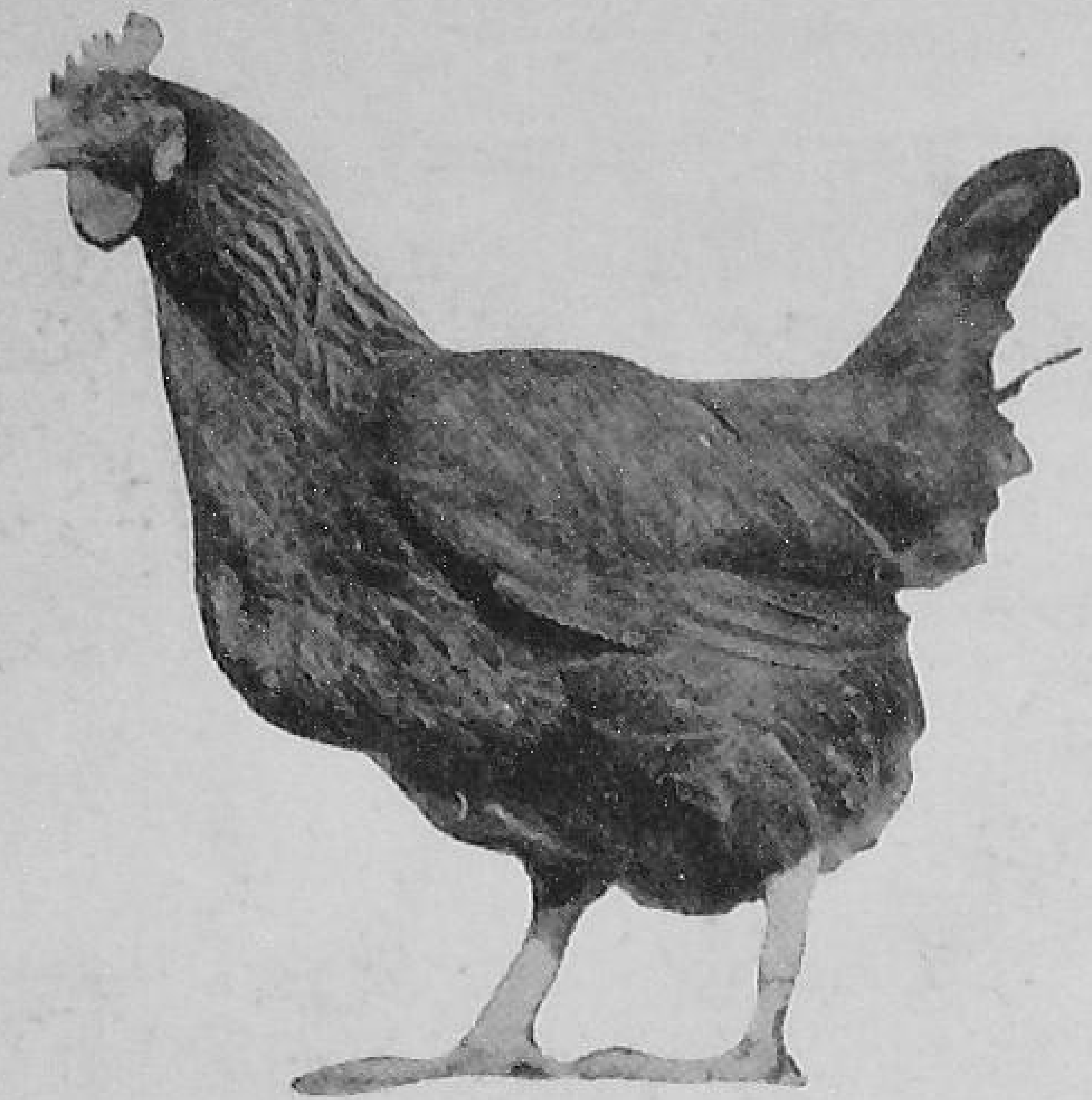
Ponnuswamy found out for himself how good a green manure can clusterbean be. An enterprising farmer, Ponnuswamy chose an area of 25 cents for the trial. The soil was loamy, locally termed as *padugai*. He ploughed the land twice and saw to it that clods were broken. He prepared seed-beds of a convenient size.

He sowed five kilograms of seeds in the plot on 16th May, 1962, and irrigated immediately after. On the third day, there were light showers. He gave the second irrigation a week later. The third irrigation was, however, given after 25 days of the second one.

The crop grow well and by the 40th day, it started flowering. The bumper crop of clusterbeans was harvested on 4th July.

He obtained a yield of 2,135 lbs which works out to be 8,540 lbs an acre. He also harvested eighty pounds of pods. Ponnuswamy feels that he could have obtained a larger quantity of pods, had he sown the crop earlier.

No wonder farmer Ponnuswamy is sold on clusterbean for his green manuring needs now. And the idea is spreading fast. This year more and more farmers in the South have taken to clusterbeans as a green manure crop.



By H. P. TANDON
Poultry Specialist
Directorate of Extension
New Delhi

MAKE HER A ROOMER, NOT A ROAMER

Very often a poultry-keeper asks a question: 'Why should not poultry be given access to open runs where they can get plenty of sunshine, greens and insects to eat, get enough exercise and where frequent cleaning is possible to maintain sanitary conditions?'

WHEN you keep a small number of hens for supply of eggs for your own requirements, you may allow them to roam about in the open run during the day time and shut them in a cage at night. But when large flocks are to be kept for commercial purposes you just cannot afford to allow your hens to roam about. You have to raise them in a different way altogether.

You have to keep your birds confined either in individual cages or on a deep litter in a room or in a shed. The deep or built-up litter system is a better system for keeping the poultry on commercial basis. In deep litter you keep the birds in a properly constructed house whose floor is covered with a thick layer of litter.

Why deep litter

Deep litter does not necessarily mean unsanitary conditions for the birds as some poultry-keepers think. The litter material and the droppings are broken up by bacteria and other micro-organisms and a dry humus-like material with a high absorptive power is produced which has a sterilizing action. After a few months, the litter develops a nutritive value also—animal protein factors (Vitamin B12) as is found in fish-meal. meat-meal and milk products, Riboflavin (Vitamin B2), other vitamins and trace elements. All these are picked up by the layers. As a result they lay a larger number of eggs and the hatchability of their eggs is also improved.

You also save land expenses and labour charges when you keep poultry in a deep litter. There is also less wastage of feed, less loss of eggs and also birds are saved from predators.

The deep litter system also ensures clean eggs which in turn mean better market prices. Similarly losses due to breakage or damage to eggs remain at a low level.

The egg-eating vice in laying hen which usually happens with the breakage of eggs on a bare ground is also greatly reduced.

However, to get all these benefits you must select a proper material for litter and also manage it properly.

What material to use

Select the material which is of organic origin, is soft, dry, fine in texture, free from dust and has high absorptive power. It should neither be so fine and soft as to be in a powder form (for it will become dusty then) nor so coarse and hard as to make its with the droppings difficult. It should also be cheap and easily available locally.

Some of the materials suitable for use as litter are rice husk, groundnut husk, cotton seed husk, wheat, barley and oat *bhoosa*, finely cut dry grass, rice straw and sugarcane fibre; saw-dust, wood shavings, dry leaves, cut and broken maize cobs, maize and *jowar* stalks, etc.

How to manage and operate deep litter

Start with clean fresh litter material for every new batch of chickens.

Start the litter at least two months before the onset of the rainy season and never during the wet weather. Before putting fresh litter on the floor, remove all the old litter and debris and thoroughly clean, scrape and scrub with boiling hot lye water and disinfect the floor, walls, internal fittings and equipment with a 50 per cent solution of cresol or crude carbolic acid.

Spray insecticides such as DDT, BHC or Pyrethrine oil base preparations for the control of ticks and mites. Allow sufficient time for the premises, fittings and equipment to get dry.

Put a five to eight cm. thick layer of clean dry earth on the cemented or brick floor and press it firm. Over this layer of earth spread a 8 to 10 cm. thick layer of suitable litter material at the time of putting chickens in the house.

Do not add any more material during the summer and rainy season except when wet patches are to be replaced. After the rainy season is over, gradually add and thoroughly mix more litter material to bring its thickness to 15 to 20 cm. by the end of November.

Do not forget that keeping the litter dry is a very important factor for successful operation of a deep litter.

Protect the litter from rains by projecting the roof beyond the side walls and hanging large boards at its ends.

Keep the water vessels over a separate enclosure draining directly to the outside and covered with expanded metal mesh.

See that attendants do not spill water on the litter while cleaning the water vessels or other equipments. Remove without delay all wet patches or caked material. Supply dry litter in their place and add, by thoroughly mixing, new litter material to maintain the required thickness.

Stir the litter with a fork frequently, for it will ensure proper mixing of the droppings with the litter material and thus help in the formation of the 'built-up litter'.

Stirring, will also help in maintaining the litter dry as the lower layers will be turned over and exposed and their water content evaporated. It will also prevent vermins from nesting and living in the litter.

Start with clean fresh litter material for every new batch of chicks

If a large portion of the litter gets damp, add mixed hydrated lime or superphosphate at one pound for six to eight square feet of the litter. But addition of lime will liberate ammonia. Do not add too much of lime as otherwise it will interfere with the formation of the deep litter. Superphosphate, if added, will increase the value of the litter as a manure for agricultural purposes. Do not mix quick lime with the litter.

Do not overcrowd the deep litter house with too many birds for it will be difficult to keep the litter dry. Overcrowding also leads to vices like toe pecking, feather picking and cannibalism. Birds also do not remain comfortable for lack of fresh air in overcrowded house. This results in their poor performance and increased mortality.

Follow this Table for guidance

Breed	No. of layers in the house	Minimum floor space reqd. per bird in sq. ft.
Light Breeds		
Leghorns, Minorcas	25	4
etc.	50	3½
	100	3
	500	2¼
	1,000	2½
Heavy Breeds		
Rhode Island Reds,	25	4½
New Hampshires	50	4
White Rocks,	100	3½
White Cornish, etc.	500	3½
	1,900	3

Fresh air is necessary to the birds, to keep litter dry and the house cool during the summer months. To ensure proper ventilation, keep the sides of the house covered with wire-netting up to a height of 2 to 2½ feet from the floor. During severe cold weather, you should hang canvas, hesian or old gunny cloth curtains to keep the house warm.

Deep litter is a good manure

At the end of a year, a properly built deep litter will have nitrogen and phosphorus (about 2.5 per cent of each) and potash (about 2 per cent) and other trace elements.

Built-up litter is one of the most valuable organic fertilizer available.

A 100 laying birds of about 5 pounds in weight yield 2½ to 3 tons of manure in a year. This can easily fetch a price of Rs. 75 to 100 per ton in the market. One ton of properly formed built-up litter will suffice for manuring half to an acre of cultivated land according to the intensity of cultivation.

Do not overcrowd the houses with too many birds

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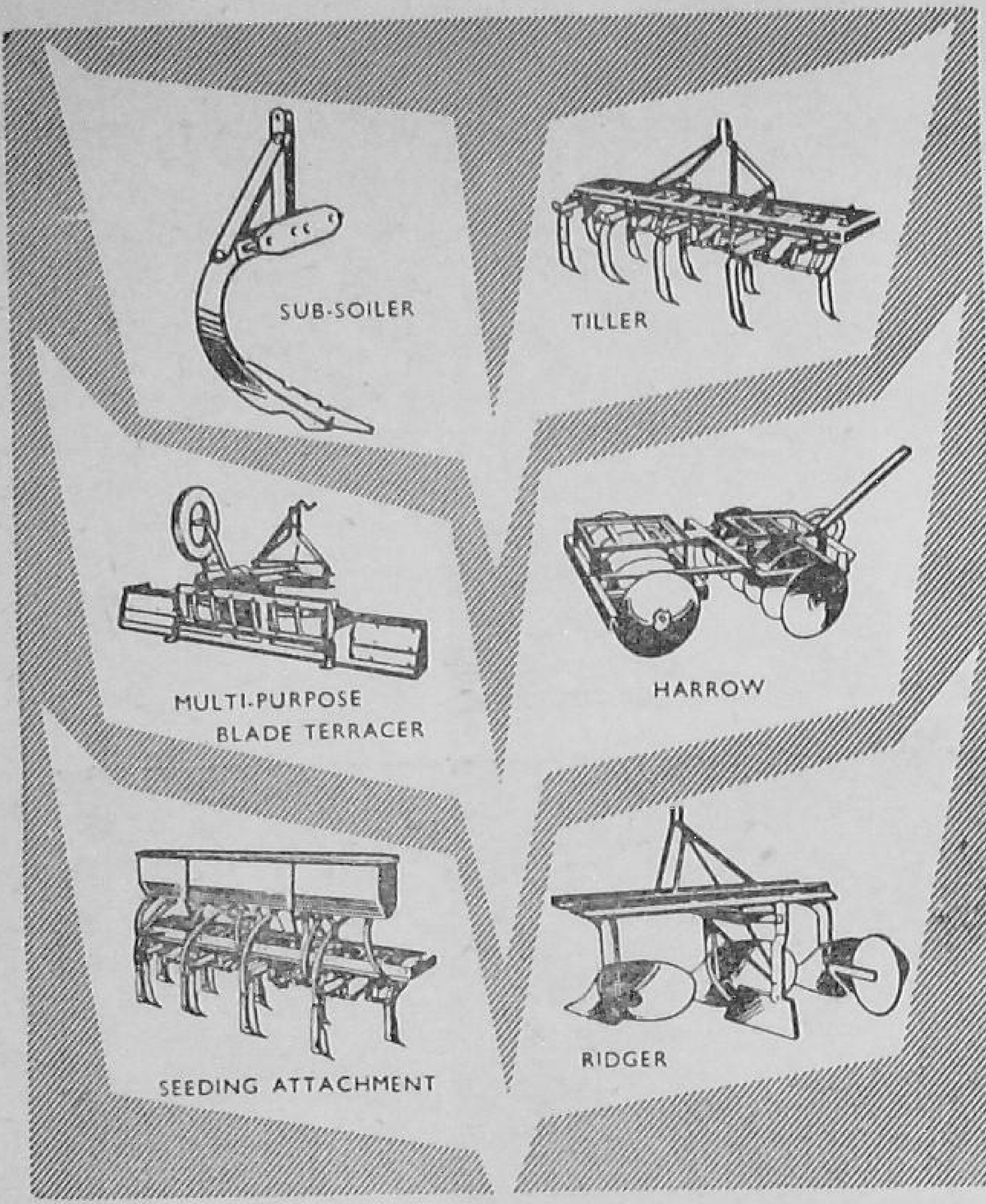

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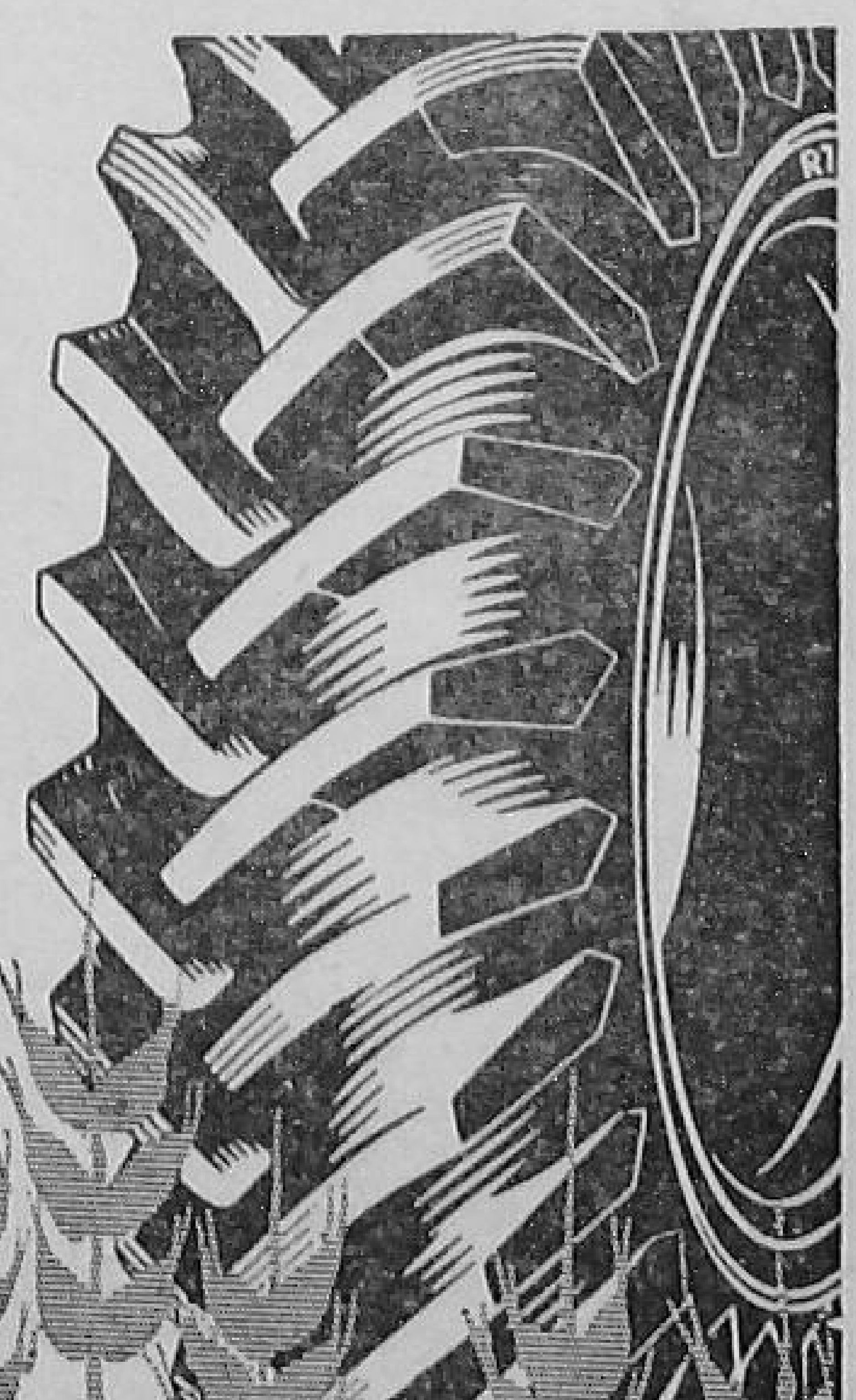

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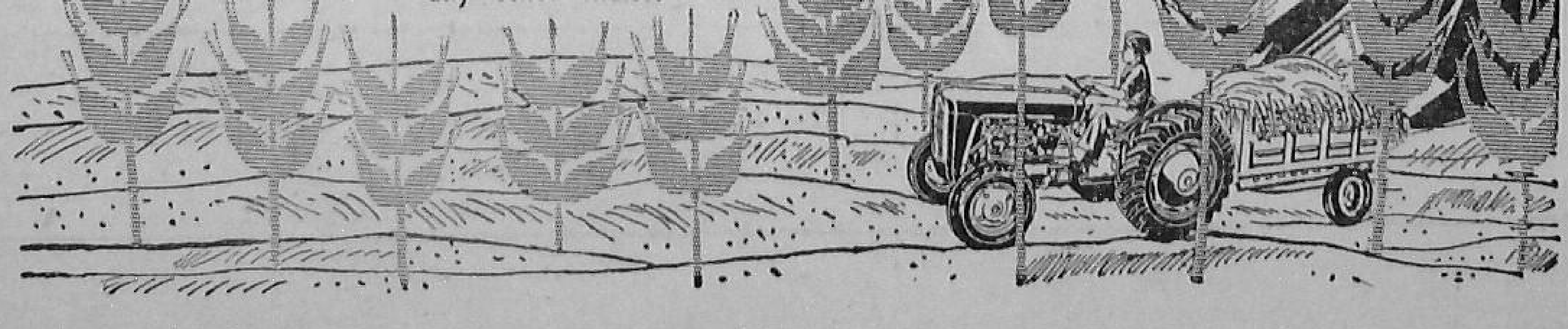

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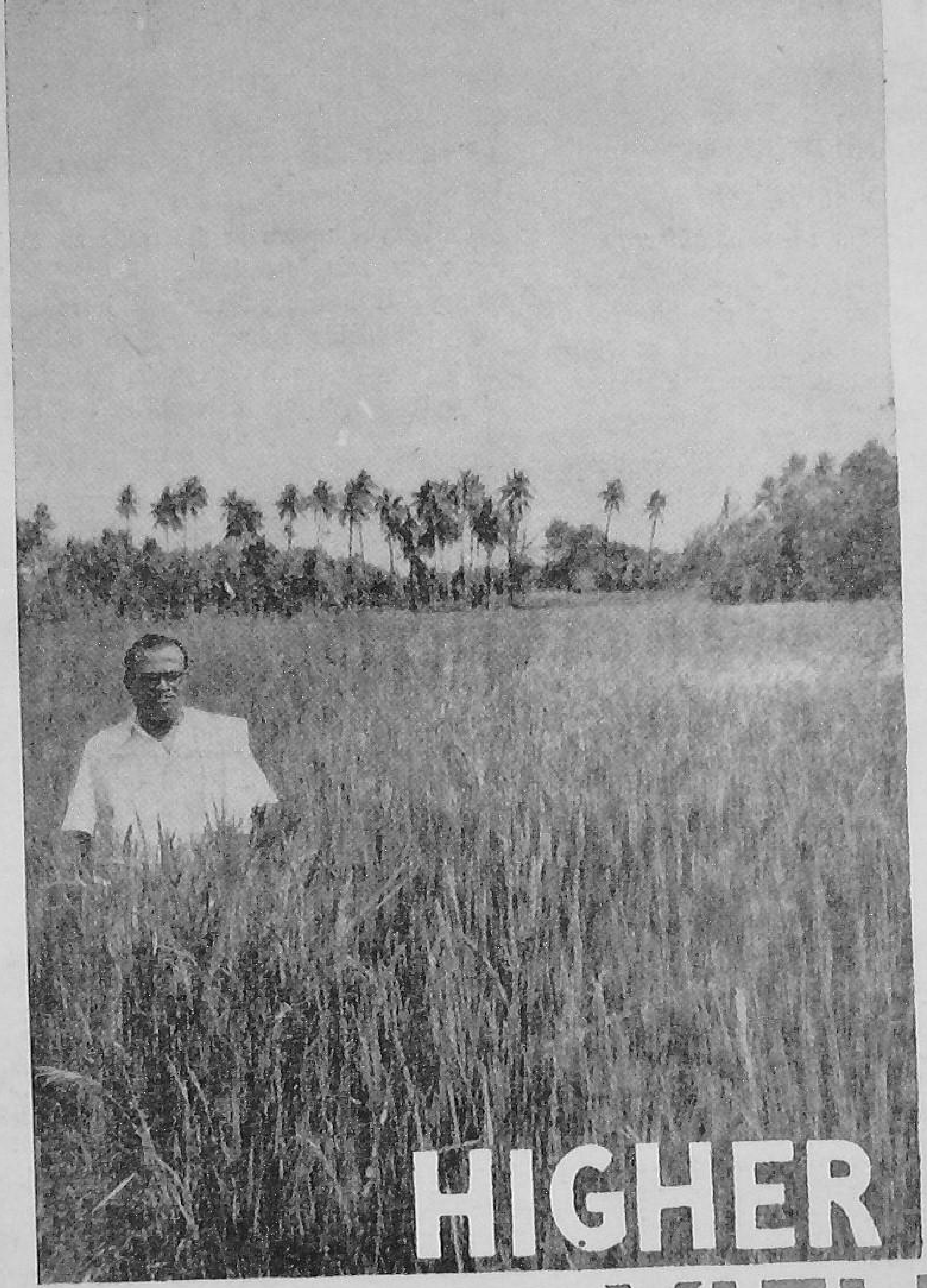

HIGHER YIELDS

His way of getting HIGHER YIELDS

By

D. MUTHUSWAMY

Farm Information Unit, Directorate of Extension, New Delhi

"TAKE package of practices; combine it with hard labour. The result will almost always be bumper yields," says Shri Vinayaksundram Pillai.

And Farmer Pillai knows what he is saying. He has results to prove that. He is the State award winner for growing 9,670 pounds of *CO*-25.

Pillai comes from Thirupanipetai village of Kumbakonam of the Package District of Tanjore in Madras.

When I visited his field last, I was impressed by the good stand of his paddy crop which was the best in the area.

The stalks and leaves had no blemish. The ears were thick and heavy. Each stalk had more than 30 suckers. And for all this heaviness, there was no lodging.

This time Shri Pillai expects a 3,500 to 4,000-pound crop, a good yield indeed for CO-30.

COTTON PESTS AND DISEASES

(*From page 17*)

The fourth treatment on about a 14-week old crop

Spray a mixture of DDT. (50 per cent W.P.) and BHC (50 per cent W.P.) at the rate of one kilogram of each insecticide in 1,000 litres of water at 450 litres of spray per acre, or dust 10 per cent Carbaryl at 7 to 14 kilograms per acre.

For the control of the disease, you should combine the spray of copper oxychloride with insecticide sprays as in the second treatment.

The fifth treatment on about a 16-week old crop

The same as in the third treatment.

The sixth treatment on about a 18-week old crop

The same as in the fourth treatment *except* the use of copper oxychloride.

The seventh treatment on about a 20-week old crop

Same as in the fifth treatment.

Mite attacks are serious on American cottons in Madras, Mysore, Andhra Pradesh and Gujarat.

Dust sulphur at 5 to 9 kilograms per acre, or spray sulphur (80 per cent wettable sulphur) at the rate of one kilogram in 250 litres of water. You can combine this with the schedule of treatment whenever necessary. Sulphur is found to be phytotoxic to certain cottons, and, therefore, should not be used on them. The quantity of the dust and spray liquid to be applied per acre would depend upon the stage of the crop growth.

(vi) *Wilt*: To check wilt, grow resistant strains of cotton like *Digvijay* and *Vijalpa* for Gujarat, *Virnar* for Khandesh, *Daulat* for Marathwada and *Jayadhar* for Mysore.

Sowing of *desi* cottons mixed with American cottons and the use of balanced fertilizers—nitrogen, phosphorus and potash—have been found to protect the crop against wilt.

(vii) *Root-rot*. The disease can be effectively reduced by inter-cropping the crop with *moth* (*Phaseolus aconitifolious*) and by adjusting the sowing time.

Carbaryl, known in the trade as 'Sevin', is a synthetic organic insecticide, belonging to carbamate group. It has been recently introduced into India. This insecticide is reported to be effective against cotton insects, such as aphids, jassids, thrips, stainers, white fly, cutworms, caterpillars and bollworms.

However, Carbaryl does not control mites.

Carbaryl in 10 per cent dust formulation is available from the agricultural officers in your State. Contact them for further information and particulars.

Take care in handling and in the use of organo-mercurial compounds and insecticides and fungicides; observe all precautions strictly.

HIGHER YIELDS

(*From page 26*)

Shri Pillai explained how he managed to get such bumper crops every season.

He had ploughed his field for his previous short crop with a tractor. He grows his own requirements of glyricidia. To the short crop he had applied 30 cart-loads of farmyard manure and compost mixed with wood-ash. He had also given groundnut cake and ammonium sulphate as top-dressing. For the present *thaladi* crop he gave two ploughings in the wet field. and added 4,000 pounds of green manure. He also used 112 pounds of superphosphate.

In his coconut garden, there was a lush growth of sannhemp. Pillai's idea was to plough it back in the coconut garden. Pillai, remarked the I.A.D.P. (Package Programme) authorities, was the first farmer to take to sannhemp as a green manure in Kumbakonam *tehsil.*

More and more farmers in the Tanjore Package District are now taking to Pillai's formula for getting high yields—package of practices plus hard labour.

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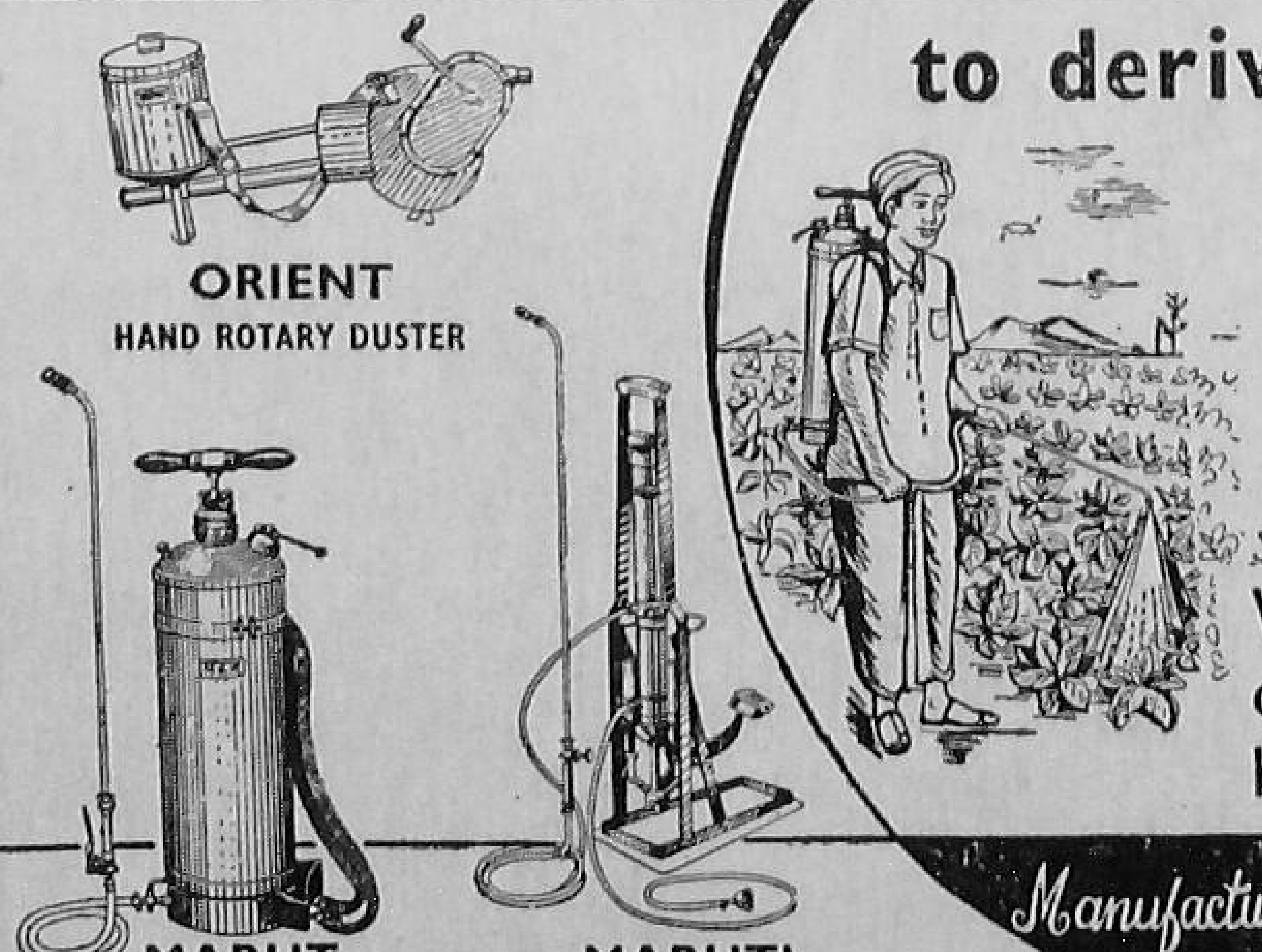

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